

Exercises easyMonteCarlo

1. Calculate the gamma dose and flux rates with respective buildup factors for the 1 GBq ^{60}Co point source and 10 cm \times 25 cm \times 25 cm (thickness \times height \times width) Pb shield. Source to shield surface distance is 5 cm, detector to shield surface distance is 50 cm. The calculation uncertainty should not exceed 5 %.
2. Calculate the gamma dose rate at 10 cm distance from the shielded 1 Ci ^{241}Am point source. The iron shield has dimensions 5 mm \times 50 cm \times 50 cm (thickness \times height \times width) and positioned in between source and detector. Perform calculations with the default (100 keV) and 10 keV gamma-ray energy thresholds. Explain the results obtained.
3. Calculate the gamma dose rates and buildup factors at 1 m distance from an unshielded 1 Ci ^{152}Eu source. Consider two source geometries: a) point source, and b) uniform distribution in the iron sphere with diameter 5 cm. Explain differences in the build factor values by modeling photon spectral distributions in both cases.
4. Calculate the neutron dose rate and dose buildup factor at 1 m distance from the 1 Ci ^{252}Cf neutron source. Consider two different shields – 20 cm paraffin and 20 cm lead. Compare dose rate values, buildup factors and contributions of thermal, epithermal and fast neutrons to the full dose rate in both cases. Explain the results obtained by modeling neutron flux in both cases.
5. Calculate the neutron dose rate at 1 m distance from a point 14 MeV neutron source emitting 10^{10} neutrons per second. Consider cases of: a) unshielded source, and b) shielded with 10 cm lead source.